

Science for Carbon Management:

Making effective connections between
users and producers of information

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Outline

- The mandate for useful carbon science
- The carbon management opportunity
- The need for a deliberate strategy
- Synthesis and Assessment: SOCCR
- Research: Reconciling Supply and Demand
- Missed opportunities and alternatives



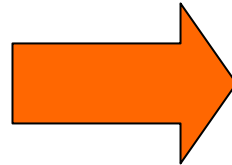
The Public Mandate

- 1957 Keeling begins Mauna Loa atmospheric CO₂ monitoring under IGY
- 1977 NAS: research “involved in the carbon dioxide problem” to “close gaps in knowledge so that future **decisions** regarding the exploitation of energy resources **can be made on as sound a basis as possible**”
- 1978 DOE: “predict the environmental, social and economic costs of increasing atmospheric CO₂ concentrations with sufficient confidence **to permit policy decisions to be made** on the future use of fossil fuels”
- 1978 U.S. National Climate Program Act; CO₂ research in “**Responding to impacts and policy implications** of climate, carbon dioxide, environment and society,”
- 1990 U.S. passes Global Change Research Act (USGCRP) to produce “**usable information on which to base policy decisions** relating to global change”
- 2001 U.S. Administration announces Climate Change Research Initiative, of which carbon cycle science is a focus to “best support improved public debate and **decision making** in the near term”
- 2003 U.S. Administration reorganizes USGCRP under the Climate Change Science Program “to provide the best possible scientific information to support **public discussion and decision making** on climate-related issues”

An Opportunity?

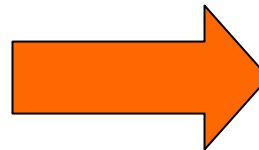
Inadvertent carbon management

- Existing for millennia
- Will continue to dominate C management
- Depends on land type, land use, actors, markets, policy



Deliberate carbon management

- Increasing interest in past 10 yrs
- Small scale
- Pilot projects
- Voluntary efforts



**FUTURE
??**

Carbon Governance?

- Both deliberate and inadvertent
- Rules TBD
- Effective across scales
- Role of public policy
- Role of markets



Carbon sequestration

■ Terrestrial

- Management practices
- Land conservation/restoration

■ Oceanic

- Deep ocean injection
- Ocean fertilization

■ Geologic

- Injection into confined geologic medium (e.g. aquifer)
- Reaction to form new stable mineral



Potential Carbon Decision Makers



- Public
 - Elected officials
 - Agency Civil Servants
 - National, Regional, State, Local
- Private
 - Individuals
 - Industry
 - Small-scale business
 - Shareholders
- Non-profit



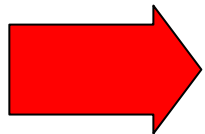
Carbon decision context

- No decision maker has solely a “climate protection” mandate
- No-one is managing for carbon exclusively:
 - Multiple interests and incentives
 - Multiple goals
 - Multiple scales
- Private sector decisions dominated by “responses to economic opportunities as mediated by institutional factors” (Lambin et al. 2001)



Basic research alone often falls short of providing decision support

- Evidence from NAPAP, providing seasonal climate forecasts, etc.
- Many reasons, such as the “wrong” information; communication; lack of trust; institutional constraints; and so on



When the process of science is separated from decision makers' needs— difficult to know what is useful



Creating science useful to decisions requires a deliberate research approach

- The creation of knowledge must be “use-inspired”
- The process of science cannot remain isolated from societal needs
- Must create knowledge that is “credible, salient and legitimate” (Clark)
- Carbon cycle program currently lacks such an approach and therefore represents an opportunity for advancing decision support



1) Synthesis and Assessment

- State of the Carbon Cycle Report (SOCCR) goals:
 - Highly credible scientific synthesis
 - Relevant to non-scientific stakeholders
- Deliberate process of engaging scientists and stakeholders
 - Stages of engagement: assessment interviews, website comments, workshops
- Engagement from the beginning--influenced the outline and early drafting process, while authors retain responsibility for content



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Stakeholders involved in SOCCR

- Government agencies
- Business
 - Utilities, Forestry, Agriculture, Carbon trading
- NGOs
 - Environmental, Industry, Trade
- Scientists
- Lacked strong participation from cities, states



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2) Research

- Reconciling supply and demand for carbon cycle science information (SPARC)
 - Characterize ‘supply’ and ‘demand’
 - Identify missed opportunities
 - Clarify institutional alternatives to improve the process of producing science useful for decision support



Example “Missed Opportunities”

- Mismatch of scale— urban areas had potential needs for information, CC science focuses on global and biome scale
- Types of information –value of credits, economic valuation more of interest than carbon budgets
- International and national users have institutional connection to science (e.g. IPCC, Federal agencies such as USDA, DOE), but other scales and sectors the connection is less clear



Alternative processes for carbon cycle science:

- Knowledge seeks application (e.g. NASA App.)
- Problem-oriented research
 - Explicit design of research projects (e.g. RISA)
 - Science-practice interface
 - Ongoing interaction with decision makers
 - Co-production of knowledge
- Boundary organizations (e.g. USDA Ext. service, some RISAs)



Thank you!

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